Khachik V. Sargsyan

Contact Information

Sandia National Laboratories
Transportation Energy Center
P.O. Box 969, MS 9051
Livermore, CA 94551

Home: (925) 456-4593
Work: (925) 294-4885
E-mail: ksargsy@sandia.gov
Web: www.umich.edu/~ksargsya

Education

University of Michigan, Ann Arbor, MI, USA

Ph.D., Applied Mathematics, August, 2007.

- Thesis: "Mean First Passage Times in the Near-Continuum Limit of Birth-Death Processes".

Moscow Institute of Physics and Technology, Moscow, Russian Federation

B.S., Applied Physics and Mathematics, June, 2001.

Fellowships, Awards, Olympiads

Geophysical Fluid Dynamics Summer Program Fellow, Woods Hole Oceanographic Institution, 2005.

Mathematics Department Summer Fellowship, University of Michigan, 2003.

MIPT Students' Math Olympiad, 3rd prize, 1998.

Soros Student Grant, Soros Foundation, 1997.

Gold Medal for extraordinary successes in high school, 1997.

38^{th} International Math Olympiad, Mar-del-Plata, Argentine, bronze medal, 1997.

37^{th} International Math Olympiad, Bombay, India, honorable mention, 1996.

Teaching Experience

University of Michigan, Ann Arbor, MI, USA

- *Graduate Student Instructor* **2002-2003, 2006-2007**
  Taught Precalculus and Calculus I. Full responsibility for lectures, homework assignments, quizzes.

- *Private Tutor* **2003 - 2005**
  Tutored undergraduate-level Number Theory, Numerical Methods, Probability Theory, Abstract Algebra, Linear Algebra, Partial Differential Equations, Mathematical Biology, Mathematical Logic, Honors Calculus.

Research Interests

- *General*: Stochastic processes, statistical analysis, numerical methods with applications in biochemistry, statistical physics, population dynamics, climate science, image recognition.
- *Specific*: Numerical stochastic methods, uncertainty quantification, model reduction, Bayesian inference, multiscale modeling, large deviations.

Research Experience

Sandia National Laboratories, Livermore, CA, USA

- *Postdoctoral Fellow* **2007 - 2010**

- *Senior Member of Technical Staff* **2010 - present**
  Member of several research projects related to computational methods and uncertainty quantification with applications in chemical kinetics, climate science, image analysis, and high-performance computing.

University of Michigan, Ann Arbor, MI, USA

- *Graduate Student Research Assistant* **2003 - 2006**
  Supported by NSF and Michigan Center for Theoretical Physics. Member of the 3-year NSF research project group "Fronts, Fluctuations and Growth".

Moscow Institute of Physics and Technology, Moscow, Russian Federation

- *Research Assistant* **1999 - 2002**
  Institute for Computer Aided Design of RAS and Institute for System Programming of RAS.

Selected Journal Publications

- Khachik Sargsyan, Cosmin Safta, Bert Debusschere and Habib Najm, "Multiparameter spectral representation of noise-induced competence in Bacillus Subtilis". *Submitted to IEEE/ACM Transactions on Computational Biology and Bioinformatics, 2012.*

- Khachik Sargsyan, Cosmin Safta, Bert Debusschere and Habib Najm, "Uncertainty quantification given discontinuous model response and a limited number of model runs". *In press, SIAM Journal on Scientific Computing, 2011.*

- Mridul Kalita, Khachik Sargsyan, Bing Tian, Adriana Paulucci, Habib Najm, Allan Brasier and Bert Debusschere, "Sources of cell-to-cell variability in canonical NF-κ B signaling pathway inferred from single cell dynamic images". *Accepted to Journal of Biological Chemistry, 2011.*

- Khachik Sargsyan, Bert Debusschere, Habib Najm and Olivier Le Maître, "Spectral representation and reduced order modeling of the dynamics of stochastic reaction networks via adaptive data partitioning". *SIAM Journal on Scientific Computing, 31, pp.4395-4421, 2010.*

- Khachik Sargsyan, Bert Debusschere, Habib Najm and Youssef Marzouk, "Bayesian inference of spectral expansions for predictability assessment in stochastic re- action networks". *Journal of Computational and Theoretical Nanoscience, 6:10, 2009.*

- Charles Doering, Khachik Sargsyan, Leonard Sander and Eric Vanden-Eijnden, "Asymptotics of rare events in birth-death processes bypassing the exact solutions". *Journal of Physics: Condensed Matter, 19:6, 2007.*

- Charles Doering, Khachik Sargsyan and Leonard Sander, "Extinction times for birth-death processes: exact results, continuum asymptotics, and the failure of the Fokker-Planck approximation". *SIAM Journal on Multiscale Modeling and Simulation, 3:2, 2005, pp.283-299.*

Conference Papers

- Khachik Sargsyan, Cosmin Safta, Bert Debusschere and Habib Najm, "Uncertainty quantification in the presence of limited climate model data with discontinuities". *IEEE International Conference in Data Mining, 2009.*

- Khachik Sargsyan, Bert Debusschere and Habib Najm, "Spectral representation and reduced order modeling of stochastic reaction networks". *Model Reduction in Reacting Flows, Workshop Proceedings, University of Notre Dame, 2009.*

- Khachik Sargsyan, "Fluctuations in chemical reactions in a large volume". *Proc. of Geophysical Fluid Dynamics Program, Woods Hole Oceanographic Institution, 2005.*

Selected Talks

- "Predictability in stochastic reaction networks". *SIAM Conference on Computational Science and Engineering,* Reno, March, 2011.

- "Uncertainty quantification challenges in climate modeling". *Uncertainty quantification for multiscale systems,* John Hopkins University, Baltimore, July, 2010.

- "Advanced tools for uncertainty quantification in climate modeling". *15-th Annual Community Earth System Model Workshop, Tri-Lab session,* Breckenridge, June, 2010.

- "Accuracy of tail regions in uncertain climate model predictions" . *SIAM Annual Meeting,* Pittsburgh, June, 2010.

- "Bayesian Methods for Discontinuity Detection in Climate Model Data", *ISBA World Meeting on Bayesian Statistics,* Benidorm, Spain, June, 2010.

- "Spectral representation and reduced order modeling of stochastic reaction networks". *International Workshop on Model Reduction in Reacting Flows,* University of Notre Dame, April, 2009.

- "Rare Events in Stochastic Systems". *Invited Talk*, Department of Applied Physics and Applied Mathematics, Columbia University, New York, January, 2007.

Other Academic Activities

- Refereed for *Physics Letters A, Journal of Computational Physics, Journal of Physical Chemistry, Journal of Guidance, Control, and Dynamics, Mathematical Biosciences, Multiscale Modeling and Simulation, Physica D, The European Physical Journal B, SIAM Journal on Scientific Computing, Computational Geosciences.*
- *Workshop on Data Hierarchies in Climate Modeling,* IPAM, University of California, Los Angeles, May, 2010.
- *Applied Mathematics Principal Investigators Meeting,* Argonne National Laboratory, Argonne, October, 2008.
- *Uncertainty Analysis in Complex, Multi-Physics Applications,* Stanford University, Stanford, July, 2008.
- *International Conference on Systems Biology*, Long Beach, October, 2007.
- Funded academic visit, Prof. Eric Vanden-Eijnden (currently at Courant Institute), Department of Mathematics, University of California, Berkeley. May, 2006.
- *Stochastic and Statistical Parameterization of Unresolved Features in the Atmosphere and Upper Ocean*, National Center for Atmospheric Research, Boulder. February, 2006.
- *Geophysical Fluid Dynamics Program Fellow*, Woods Hole Oceanographic Institution, Woods Hole. June-August, 2005.

Skills

- Fluent in English, Russian, Armenian. Reading knowledge of French.

- C/C++, Fortran, Python.
- Matlab, Mathematica, Maple, Mathcad.
- Java, JavaScript, HTML.
- Tex, LaTeX.

References

Upon request.